GROWING THE VERMONT GREEN BUILDING INDUSTRY

Preliminary Findings for the Green Building Industry and Education Centers of Excellence (IECE)

Prepared for

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April 15, 2010

Acknowledgements

The authors deeply appreciate the thoughtful input that helped to inform and strengthen this report. Special thanks go to all of the Skills Council participants, as well as Department of Education's Doug Webster and John Fischer, Vermont Workforce Development Council Executive Director Chip Evans, Department of Labor Commissioner Patricia Moulton-Powden and Department of Education Commissioner Armando Vilaseca for their commitment to advancing the green building industry in Vermont.

We would like to acknowledge funding support for this project provided by:

- The Office of Senator Patrick Leahy
- The President's Community-Based Job Training Grants as implemented by the U.S. Department of Labor's Employment & Training Administration.

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1.0 Executive Summary

The Vermont green building industry is poised to experience strong growth over the next two to five years. Though industry growth is currently flat or negative – along with state and national economies – the businesses that comprise this evolving sector are well positioned to expand along with an economic recovery. In fact, it is expected that the Vermont green building industry will grow faster than much of the economy-at-large due to the increasing demand for environmentally and economically oriented construction, design, and maintenance products and services. Vermont has deep and rich expertise in the green building industry and, as such, the industry has the potential to not only support in-state demand for these products and services, but to export its capabilities on a regional and national basis.

This report provides an in-depth look at the green building industry in Vermont by (1) identifying the challenges in meeting the green building sector's workforce needs, and (2) developing the potential solutions to bridging the gap between business-as-usual and future needs in workforce preparation and skills training.

Potential of the Vermont Green Building Industry

Employment growth in Vermont's green construction sector is difficult to project because it is highly dependent on outside variables such as the cost of energy, interest rates, consumer acceptance, and the overall economic recovery.

Some sources have projected national growth rates of up to 25% a year for the green construction sector[1], however, unless all the relevant variables line up perfectly, this is unlikely. Green construction is currently a small portion of the overall industry, nevertheless, green skills will become increasingly important in coming years.

At its peak in 1989 the construction sector in Vermont employed 17,700 workers, and in 2005, the most recent high-point, employment reached 17,000. Emerging from past recessions, the industry has always regained its previous levels of employment. If this pattern holds true, over a five year recovery period the industry would need to add 2,000 workers above its 2010 employment level. Many of these individuals have construction backgrounds, but will need training in the green skills that will become increasingly important on the job. An additional 416 openings for workers will come from retirements of older workers and turnover each year, and 160 jobs will become available annually as a result of the rebound of the industry. Again, the pace of the economic recovery will play a role, but the overall direction is clear.

In addition to preparing these new workers, there will be a "greening" of practices in the industry that will create demand for training for the incumbent workforce. At some point a significant number, if not all, workers in the industry will need to master and apply new green skills and the workers and firms that adopt these practices early will be competitively positioned for the future.

Beyond residential and commercial construction, the green building industry is closely related to industries and occupations ranging from green building design, weatherization, building-integrated renewable energy installation, manufacture of building components, commissioning

[1] According to Zpryme, a workforce research and consulting firm. See *Appendix B: Industry Resources* for source.

and recommissioning services, land-use planning, and redevelopment consulting, etc. These represent possibilities for firm diversification and additional career opportunities for workers in this sector.

Taken together, the Vermont green building industry, including construction and related non-construction, represent a sector that is poised to continue growing for the foreseeable future.

These trends indicate that there will be increasing demand in the job market for green skills for new workers entering the industry, for replacement workers, and for up-skilling the existing workforce. Schools, colleges, in-house employer programs and organized labor programs will all be affected and should be seeking ways to anticipate and respond to these opportunities.

Industry Challenges & Solutions

However promising the outlook, the industry does face challenges to growth. Chief among them are lackluster market demand, high cost of goods, and an aging and underskilled workforce. Assuming that an economic recovery will serve to address the first two concerns, the focus of this preliminary report is on the industry's workforce challenges and effective ways to meet those challenges. Because it is anticipated Vermont's green building industry will continue to grow and include new workers each year, the overarching question posed was: *Where will these workers come from, what skills will they have, and how will they be prepared to enter the workforce*?

Funded by The Vermont Departments of Education and Labor, a range of green building industry representative businesses gathered throughout the fall of 2009 to define the industry, identify and quantify its workforce needs over the next five years, and forge a collaborative working relationship aimed at meeting those needs. Key findings from this preliminary scoping process indicate that:

- Vermont's green building industry has been – and will continue to be – a critical growth sector for the Vermont economy.
- There is a need to better define and quantify the industry – as well as its resources, growth trajectory, and workforce requirements.
- The industry is poised for growth over the next five years but does not have ready access to a prepared workforce necessary to fully capitalize on that growth.
- There is a lack of shared knowledge among industry businesses regarding workforce training and educational resources that could potentially serve the industry's needs.
- There is a general lack of information sharing and coordination among green building industry businesses regarding industry resources, growth trends, and workforce development.
- There are potential green building industry workforce candidates emerging from schools and non-growth industries that will require training and education.
- Industry-related workforce training and education programs must meet the needs of potential workforce candidates at a broad range of ages and professional levels.
- Certification and credential programs specific to the industry exist, although many valuable skill sets also exist outside of these credentials.

- Industry employers need to refine and create new credential programs to meet the future needs in skill training.
- There is a general lack of understanding among industry businesses regarding their relationship with state government and the capacity for state legislators and departments to support the industry's growth.
- There is interest among industry businesses in developing an industry "skills council" – in some form to be determined – aimed at identifying and addressing workforce challenges facing the industry.

To most effectively capitalize on this key growth sector in the Vermont economy, the green building industry and its supporters within state government should consider these findings carefully. Recommended next steps will be to create a structure, strategy, and process for industry information sharing, workforce development, and relationship-building with state decision-makers. For it is only through a considered, collaborative, and strategic approach that one of Vermont's most exciting and promising industries can realize its fullest potential – and contribute its considerable power to the state's advancing economy.

2.0 Forming the Vermont Green Building IECE

Process Background & Scope

The Vermont Department of Education (DOE) in partnership with the Vermont Department of Labor (DOL) and the State Workforce Development Council (WDC) established the Industry and Education Centers of Excellence Initiative (IECE) in early 2009. Goals of the IECE are to (1) strengthen the State's career education and training programs, (2) provide Vermonters incentives to pursue careers in Vermont, and (3) to support sustainable economic and socially responsible commerce.

Building upon the success of the IECE in the hospitality and tourism sector created earlier in the year, the DOL, DOE and WDC established an IECE for Vermont's Green Building industry in the summer of 2009. This initiative aims to provide a forum and infrastructure for businesses in the building industry to influence future investments in education and training initiatives. The DOL DOE and the WDC believe it is important that businesses drive the future of the curriculum, so as to ensure a knowledgeable workforce is available to move into the industry upon completion of their educational experience. In short, the Green Building IECE offers an opportunity for the private sector to impact workforce development initiatives, influence spending priorities, and advance the industry as a whole, specifically through the work of Green Building Skills Councils.

Figure 1 below illustrates the IECE framework and progression. Within the IECE process, employers help to shape the industry's workforce by working collaboratively through industry-specific skills councils. Skills councils are then involved in every step of workforce development for their industry:

1. Via the industry skills council, employers articulate their workforce needs (certifications, training, credentials, education levels, etc.) to state workforce preparation entities, state workforce-related departments, and Vermont policymakers.

2. State workforce-related offices support workforce preparation entities and the industry skill council with resources, grants, legislative support, skills council support, etc.
3. Workforce preparation entities develop programs and deliver training, education, and certifications to the available workforce in coordination with the skills council.
4. Vermont employers attract the newly prepared workforce through coherent industry marketing, messaging, recruitment, internships, job fairs, etc. coordinated through the skill councils.
5. Trained, certified, and prepared workforce successfully joins Vermont employers to meet the needs of the growing industry.

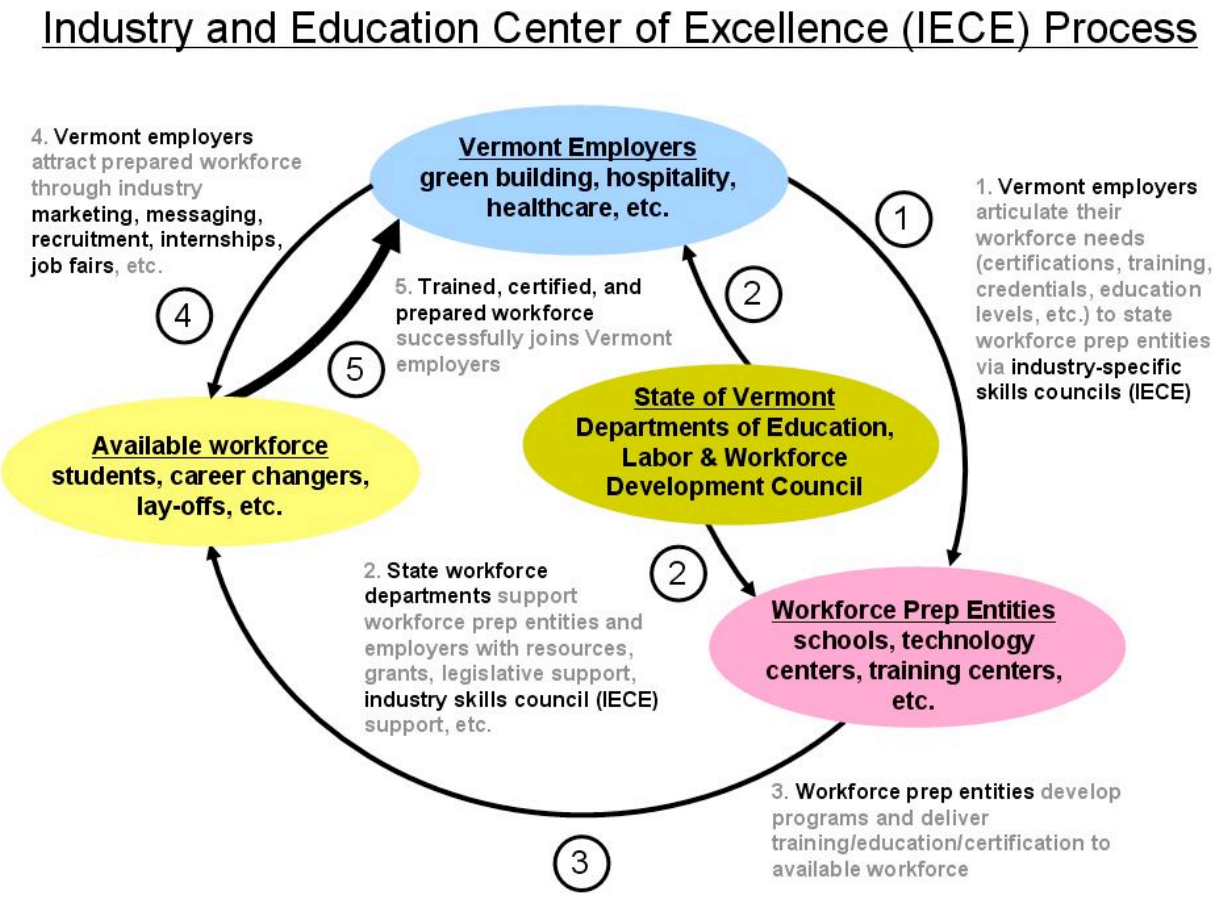


Figure 1: Industry and Education Center of Excellence (IECE) Process

Within the IECE process, employers have the opportunity to influence the process of preparing the industry's workforce by working collaboratively through skills councils to offer a clear, coherent message. Small groups of industry employers with common interests, markets, products, and processes within an economic cluster or sector tend to be more cohesive and functional than a cohort of business groups representing diverse interests with significantly different customers and suppliers. For example, to maximize capturing the largest representation of the green industry, initial discussions focused in four areas: 1) green building, 2) renewable energy, 3) energy efficiency, and 4) carbon management and technologies. Since

1) green building includes 2) and 3), and to some extent 4), the Scope of the Project included aspects of this larger green industry embedded within the green building discussion. Consequently the project analysis included customer driven aspects of carbon management, energy efficiency, and renewable energy as related to the green building industry.

According to the IECE methodology, Skills Councils are made up of key employers from high performance organizations, high school instructors, career and technical education instructors, postsecondary staff or faculty members, organized labor, and DOE/DOL representatives. A council will assist in determining workforce and skill gaps, skill standards and measurement criteria, credentialing and employment selection methods, facilitate workforce apprenticeships, industry and career promotion assistance, and support career ladder and advancement opportunities.

In June of 2009, Spring Hill Solutions was contracted to facilitate the initial stages of the IECE development process, specifically focusing on Vermont's green building industry, as illustrated below.

Spring Hill focused on the first two of the six steps in the overall IECE process, with later phases of the Green Building IECE work to begin in 2010. Steps three through six of the Green Building IECE process will utilize the current findings as a foundation to promote workforce development in the industry. To implement this effort, Spring Hill performed the following tasks to establish, test, and support the Green Building IECE in the following ways:

1. **Identify experts** in the green building industry with interest in working on workforce development initiatives.
2. **Convene a group of 10-15 Vermont Green Building Industry business leaders** interested in participating in the formation of a Green Building Skills Council.
3. **Facilitate three initial meetings** of the Skills Council.
4. **Articulate and document industry challenges** and potential solutions.
5. **Assess group support** for taking the next steps.
6. **Identify and compile** a database of industry-related organizations and resources.

Process Participants

The Skills Council was comprised largely of business leaders in the green building industry, representatives from training facilities and educational programs, and DOE and DOL staff. A list of industry representatives who attended at least one of the three initial skills council meetings is provided in Table 1 below. Full listings, including contact information for each attendee, are included in *Appendix A*.

Table 1: Green Building Skills Council – Attendees of Initial Three Meetings

	Subsector	Company	Name	Title	Meetings Attended
Employers	Architects	Dore & Whittier	Bruce Dillon	Director of Business Development	2
	Building Commissioning	CX Associates	Jennier Chiodo	Principal	2
	Building Commissioning	Kilawatt Technologies	Steven "Rocco" Antinozzi	VP of Operations	2
	Construction	Bickford Construction	Bob Bickford	Principal	3
	Construction	JA Morrissey	Jeanne Morrissey	Principal	1
	Construction	JA Morrissey	Doug White	Project Manager	3
	Design/Build	Peregrine Design/Build	Tim Frost	Principal	3
	Design/Build	The Design Group VT	Jeff Schoellkopf	Principal	1
	Design/Build	Tom Perry Carpentry, Building & Design	Tom Perry	Principal	3
	Redevelopment	Encore Redevelopment	Chad Farrell	Principal	2
Educators	Efficiency	VEIC	David Keefe	Expert Staff Trainer	3
	Construction / Contractors	Associated General Contractors of Vermont	Beth Hulbert	Director of Workforce Development	3
	Design / Construction	Yestermorrow	Kate Stephenson	Executive Director	3
	Green Building Association	VT Green Building Network	Nancy Mears	Executive Director	1
	Labor Union / Training	International Brotherhood of Electrical Workers (IBEW) Local 300	Matt Lash	Membership Development Director	2
Government	Workforce Development	Dept. of Education	Doug Webster	Industry Skill Standards Coordinator	3
	Workforce Development	Vt. Workforce Development Council	Chip Evans	Executive Director of Workforce Dev. Council	2
	Workforce Development	Dept. of Labor	Commissioner Patricia Moulton Powden	VT Commissioner of Labor	1

Additionally, other industry experts expressed interest in participating in this important group in the future. A listing of these other interested parties is also included in *Appendix A*.

3.0 Defining and Quantifying the Vermont Green Building Industry

Defining the Industry

For the purposes of the Skills Council, the group utilized the following working definition of green building from Wikipedia.org:

*A **green building** is an outcome of a design philosophy which focuses on increasing the efficiency of resource use — energy, water, and materials — while reducing building impacts on human health and the environment during the building's lifecycle, through better siting, design, construction, operation, maintenance, and removal. Though green building is interpreted in many different ways, a common view is that they should be designed and operated to reduce the overall impact of the built environment on human health and the natural environment by:*

- *Efficiently using energy, water, and other resources*
- *Protecting occupant health and improving employee productivity*
- *Reducing waste, pollution and environmental degradation*

Skills Council members agreed that other key ideas for a more progressive definition of green building should be incorporated, though a new working definition was never articulated. Concepts discussed included: abundance, renewal, regeneration, local materials/jobs, durability, and adaptability.

During the first Skills Council meeting on September 29, 2009, it was established that building-integrated renewable technologies are an important component of the definition of green building into the future. Spring Hill subsequently broadened its outreach to include representatives from this subsector.

During the second meeting on October 22, 2009, the skills council group identified subsectors of the green building industry deemed important to distinguish when discussing the industry as a whole. These seven subsectors are presented in Table 2 below – in rough sequential order as they relate to an overall “green building development” process. Subsectors coded in yellow in Table 2 were not represented at the three initial Skills Council meetings but may be appropriate to include as the Council evolves.

Table 2: Subsectors of the Green Building Industry

Green Building Industry Subsectors	Represented at Skills Council?
Technical Consultants, Commissioning, Ongoing Optimization	Yes
Public servants, Legislators, Building inspectors, Code writers, Planners	No
Developers, Financiers, Owners	No
Designers, Architects, Engineers (Civil, Mechanical, HVAC, Electrical, Thermodynamic, Environmental)	Yes
Builders, General contractors, Construction Managers	Yes
Installers, Laborers, Trades	Yes
End Users: Building Owners, Realtors, Maintenance/ Facility Managers, Building Operators	No

The Skills Council actively discussed the question of whether it is appropriate – or even possible – for one industry group to represent all seven subsectors of the industry, and for both residential and commercial clusters. The emerging consensus was that Skills Council members would like to continue coordinating as an umbrella industry group, and divide into smaller groups to focus on subsector issues as needed.

Quantifying the Industry

A key objective for the group was to quantify the green building industry in Vermont – such as employment figures, growth rates, etc. However, a centralized database of such figures does not (yet) exist for the green building industry and so we extrapolated from other industries and anecdotal information from Skills Council members. Presented below are figures from the Vermont construction industry and national figures about the green building industry.

Some of the key quantifications of the *construction industry* in Vermont include the following:

- **Half of the Vermont construction industry workforce is employed by companies with 9 or fewer employees.** Many of those smaller employers were participants in the Skills Council meetings. Workforce development strategies will have to meet the needs of small employers.
- **At its peak in 1989 the construction sector in Vermont employed 17,700 workers**, **and in 2005, the most recent high-point, employment reached 17,000.** According to Chip Evans of the Workforce Development Council, the industry has always regained its previous levels of employment emerging from past recessions. If this pattern holds true, over a five year recovery period the industry would need to add 2,000 workers above its 2010 employment level.
- **Retirements and turnover will open up 416 jobs each year, and 160 jobs will become available annually as a result of the rebound of the industry.** Many of these individuals have construction backgrounds, but will need training in the green skills that will become increasingly important on the job.
- **Women comprise approximately 15% of the industry.** This number has not changed much in 10 years.

- **The average age in the construction workforce is 55**, indicating that skills of older workers will be lost as they leave the workforce in the coming years. Older workers tend to have the greatest skills; additional training resources will have to be devoted to bringing in younger workers.
- **Mean annual earnings in the sector were $39,780 in 2008**. This figure is above the average Vermont earnings, indicating that the construction industry can be a financially attractive career option.

Nationally, the green building industry is poised to grow thanks to federal stimulus funding and an increasing demand for environmentally and economically oriented construction, design, and maintenance products and services. For example, the U.S. Green Building Council's LEED green building rating system in 2009 is estimated to grow by over 40% compared to 2008 totals, for a cumulative total of over 7 billion square feet worldwide since the standard was launched in 2000. Other indicators of industry growth[2]:

- According to a report by AmericanProgress.org, the $100 billion green stimulus program will create a total of two million jobs in green areas, including nearly one million “direct” jobs (construction, weatherization, the installation of building-integrated renewables).
- $55 million in green jobs grants were authorized by the American Recovery and Reinvestment Act of 2009, including $5.8 million in green capacity building grants to focus specifically on training opportunities.
- A recent USGBC/Booz Allen Hamilton Report shows green construction to contribute $554 billion to U.S. GDP over the next five years.
- The U.S. green building market is accelerating at a dramatic rate, states McGraw-Hill Construction's Green Outlook 2009: Trends Driving Change report, and could triple by 2013.

To better gauge the growth and employment potential of the green building industry in Vermont, Skills Council participants responded to survey questions regarding their projected growth and expected hiring in two and five years. Employers were asked about how many employees they expected to hire, whereas educators were asked how many people they expected to train in two and five years. Results are presented in Table 3.

[2] Refer to *Appendix B: Industry Resources* for additional information and sources.

Table 3: Projected Growth in Two and Five Years for Skills Council Members

	Subsector	Company Name	Current Employees/ *Members	How many people expected to hire or *train	
				2 Years	5 Years
Employers	Construction	JAM Green	25	1-2	1-2
	Design/Build	Tom Perry Carpentry, Building & Design	4	1-2	3-5
	Design/Build	Peregrine Design / Build	10	3-5	6-10
	Building Commissioning	Kilawatt Technologies	3	6-10	11+
	Building Commissioning	CX Associates	6	1-2	3-5
	Architects	Dore & Whittier Architects, Inc.	45	0	0
	Design/Build	Bickford Construction	7	3-5	6-10
	Redevelopment	Encore Redevelopment	4	3-5	3-5
Educators	Electricians/Laborers	IBEW Local 300	1200*	51-100*	251-500*
	Green Building	Vermont Green Building Network	150-200*	51-100*	101-250*
	Efficiency	VEIC	180	51-100*	>501*
	Green Building	Yestermorrow	10	2000*	5000*
	Contractors	Associated General Contractors	140*	101-250*	>501*

As Table 3 above shows, expected hiring over the next five years vary from zero (Bruce Dillon of Dore & Whittier explained that the firm will strategically grow in terms of services and projects, but that they do not have any plans to hire additional employees) to nearly 400% as in the case of Kilawatt Technologies. Most other employers plan to double in size within the next five years.

Though green building industry growth is currently flat or negative – along with state and national economies – the above results and findings indicate that Vermont's green building-related businesses may be well positioned to expand along with an economic recovery. In fact, the Vermont green building industry may grow faster than much of the economy due to the increasing demand for environmentally and economically oriented construction, design, and maintenance products and services.

Some sources have projected national growth rates of up to 25% a year for the green construction sector[3], however, unless all the relevant variables line up perfectly, this is unlikely. Green construction is currently a small portion of the overall industry, nevertheless, green skills will become increasingly important in coming years.

In addition to preparing new workers to fill the worker gaps due to retirement and turnover, there will be a "greening" of practices in the industry that will create demand for training for the incumbent workforce. At some point a significant number, if not all, workers in the industry will

[3] According to Zpryme, a workforce research and consulting firm. See *Appendix B: Industry Resources* for source.

need to master and apply new green skills and the workers and firms that adopt these practices early will be competitively positioned for the future.

Beyond residential and commercial construction, the green building industry is closely related to industries and occupations ranging from green building design, weatherization, building-integrated renewable energy installation, manufacture of building components, commissioning and recommissioning services, land-use planning, and redevelopment consulting, etc. These represent possibilities for firm diversification and additional career opportunities for workers in this sector.

Taken together, the Vermont green building industry, including construction and related non-construction, represent a sector that is poised to continue growing for the foreseeable future.[4]

Industry Skill Needs

Over the course of the three initial meetings, Skills Council members articulated a number of industry-specific (both technical and non-technical) and general skills that they wished to see advanced through training programs in the state. Results are presented in Table 4 below.

Table 4: Green Building Industry Skill Needs

Industry-specific Skills		General Skills
Technical Skills (listed in order of indicated importance)	**Non-technical Skills**	
• Smart-grid technology • Deep energy retrofits • Energy analysis • Building automation / HVAC • Net-zero concepts • Weatherization • Advanced Framing • Site Design • Specific product & vendor training • Energy modeling software (e.g., BIM)	• Industry Incentives • Green Building 101 • Wholistic design & systems thinking	• Communication • Writing • Trend identification • Business development & sales • Marketing • Analytic skills • Project management • Finance & Capital budget • Statistics • Microsoft Excel and Access • Business Operations • Spec writing

Both employers and educators in the Skills Council placed a high value on skill-building in technical areas related to reducing their carbon footprint related to energy use and waste. The top three topics in which Skills Council members would like to see trainings offered are directly

[4] Discussions with employers in Vermont's green building industry frequently referenced a 20-50% projected growth rate for the industry within the next five years. To note one specific example: Jennifer Chiodo of CX Associates explained on the survey form a projected a growth rate of 20-30% for the building commissioning subsector.

related to energy technology, indicating the extent to which the future of Vermont's green building industry is related to energy efficiency and renewable energy technology.

Council members also discussed the need for non-technical skill-building and brainstormed ideas such as "Green Building 101" courses at Vermont's 17 career and technical centers, which might encompass a basic overview of the concepts behind green building. Green Building 101 can be incorporated within a Green Building or Green Technologies 'Program of Study' that includes a sequence of courses between high schools, career and technical centers, employer driven internships, college programs including dual enrollment options at the secondary level, and online course delivery. The Green Building IECE could facilitate the design of the Green Building 101 course, which would offer assessments and certifications available to high school and college students as well as the general public and incumbent workers.

Worker Outcomes

Table 5 below lists desired worker outcomes identified by the Skills Council in the form of selected green building certifications and credentials. Many certifications and other credential programs exist that promote the above skills, although the Skills Council members, representing such a variety of industry subsectors, did not have a clear consensus on which programs are "most" important. Additionally, many skill sets exist outside of these credentials; thus we see ample opportunity for employers to influence the creation of new credential programs to meet the future needs in skill training.

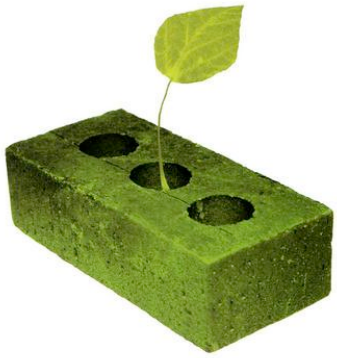
Table 5: Selected Certifications & Credentials for Vermont Green Building Industry

Certifications & Credentials Vermont Currently Used by Vermont Businesses		
Certification/Credential	**Geographic Range**	**VT Training Providers**
Leadership in Energy and Environmental Design (LEED)	International	VGBN
Building Performance Institute (BPI) Certification	National	Efficiency Vermont
Home Performance with ENGERY STAR Certification	National	Efficiency Vermont
Green Advantage	National	AGC
Vermont Builds Greener	State	Builders for Social Responsibility
IBEW Solar Installation Training	State	IBEW Local 300
Other Certifications & Credentials		
Certification/Credential	**Geographic Range**	**VT Training Providers**
Permaculture Certification	International	Yestermorrow
Certified Energy Manager (CEM)	National	N/A
Green Building Engineer (GBE™)	National	N/A
Certified Green Professional	National	N/A

Additional credentials and resources to access the above credentials are listed in *Appendix B: Industry Resources.*

4.0 Workforce Challenges & Solutions for the Vermont Green Building Industry

Industry Workforce Challenges



Throughout the three initial Skills Council meetings, several industry challenges emerged as common themes. These challenges were sometimes articulated explicitly by skills council members, (e.g., concerns that relate to marketing the industry), while others are challenges that Spring Hill observed throughout the meetings (e.g., lack of knowledge about resources, lack of unified industry voice). Below are listed identified industry challenges; in the section that follows we present possible strategies to addressing these industry challenges.

1. **Employers don't know about available resources**. During the three Skills Council meetings, Spring Hill observed many instances where industry representatives were unaware of programs and resources that already exist within the state. For example, by the time of our third meeting in early November, Associated General Contractors still had $40,000 that had to be spent by the end of the year on trainings, but they did not have any employers coming forward seeking their services. This may reflect a lack of awareness of the resources available within the state.

2. **Negative perception of industry as career option.** The need to increase the career promotion in the state emerged as a theme during all three meetings. Skills Council participants clearly believe that creating the right training and certifications are a moot point if the interest in this field as a career is lacking among youth.

3. **Public perception of 'green buildings' costing too much.** This is another marketing challenge that emerged many times in conversation. A negative public perception of the green industry, a perception of green as a fad, and obvious cost barriers will hinder future growth of the industry. As Bob Bickford of Bickford Construction commented at the third Skills Council meeting: "People make lifestyle decisions around costs."

4. **Difficult for employers to find time for trainings.** This challenge emerged during our second Skills Council meeting as the "Worry Warts" group articulated their top concerns for the industry's future growth. Many small employers find it difficult to set time aside for trainings, or to encourage employees to miss work to attend trainings. Nancy Mears, Executive Director of the nonprofit Vermont Green Building Network (VGBN), expressed concern that VGBN workshops frequently have low attendance, which may be indicative of this problem or the resource knowledge problem referenced in challenge number one.

5. **Finding employees with the right skill level, experience, and certifications.** Skills Council members articulated concerns about finding skilled employees within the state.

This challenge points to not only a need to educate the next generation of the workforce on skills specific to Vermont's green building industry, but also to a need for central information about jobs in the industry, for instance. The right employees may exist, but some small businesses encounter a hurdle when trying to advertise employment opportunities through traditional methods. For example, Rocco Antinozzi of Kilawatt Technologies explained that their efforts to hire someone knowledgeable about building automation systems brought in many applicants but very few were qualified and skilled in this area. Beth Hulbert of AGC encouraged employers to seek out students from Vermont's 17 career and technical centers, arguing that the myth that the Centers are missing the 'cream of the crop' students is inaccurate.

6. **Lack of unified industry voice.** While some participants expressed hesitation about the ability for Vermont's green building industry to *have* a unified voice, others felt that a unified voice would be possible and appropriate when articulating needs to government decision-makers, for example. One outcome of the Skills Council meetings is a strong interest in continuing to meet as a diverse and dynamic group around specific goals.

Solutions to Workforce Challenges

The challenges articulated in the previous section point to opportunities for future directions for the Skills Council as the group continues to work together to advance workforce development opportunities in the state. In the third Skills Council meeting, participants discussed the ideas below and prioritized this list in their survey responses. Below are nine ideas presented in priority order according to Skills Council participants from Green Building Industry employers. Not surprisingly, educators offered a slightly different perspective, for instance, giving more weight to strategies that incorporate educational components.

1. **Continue the Green Building IECE.** Overall we found strong support among all Skills Council participants for the IECE initiative and for continued involvement in the Green Building Skills Council. When surveyed at the final IECE meeting, six of the seven business representatives agreed to participate in future Skills Council meetings, while all of the representatives from training programs agreed it would be valuable to continue to meet.

   Affirmative, supportive survey responses included the following: "This is a good vehicle for moving ideas into reality," believes Doug White of JAM Green. "It is valuable for organized labor to meet with decision makers involved in the green industries," said Matt Lash of IBEW Local 300.

   Some participants, while expressing interest in staying involved in the future, explained in the survey that they would like clear direction and goals for future meetings before agreeing to attend future meetings. Rocco Antinozzi of Kilawatt Technologies responded that he would not be willing to devote time to participate in the future, despite his support for the mission of the Green Building IECE, as it is "a stretch from our primary business focus."

It was also the general consensus that meetings should take place on a less regular basis than monthly. We suggest that quarterly meetings with occasional electronic contact might be appropriate.

Continuing the Green Building IECE initiative will provide a voice for the industry and a platform for moving forward with other solutions to the workforce challenges the industry faces. Larger goals of the Green Building IECE can address each of the industry's challenges through some of the ideas presented below.

Skills Council participants discussed whether the varied subsectors and the differences between residential and commercial could all be represented by one industry group. One Skills Council attendee questioned how the group will grapple with the differences – between the professional path (i.e., architects, engineers, project managers) and the skilled labor path – over time to make the best use of the knowledge and skills at the table. While there is no clear answer to this question at the moment, the group agreed that it was a topic to discuss going forward as the future of the Green Building Skills Council takes shape.

As for who should coordinate and facilitate the Green Building IECE, survey responses varied and included the following: Department of Labor, ACG, VGBN, and the Homebuilders and Remodelers Association.

2. **Engage in industry promotion and rebranding.** Addressing the problems of negative public perception, both for the green industry as a whole and the career opportunities within the green building industry, are important steps for the future success of the Green Building IECE. At the third Skills Council meeting, Chip Evans of the Workforce Development Council discussed the AHEC promotion campaign as a model of a successful marketing effort in the health care industry, which might be emulated for the green building industry. As well, a negative public perception of careers in technical areas results in underutilization of technical education resources. A comprehensive green building career promotion effort would help to encourage ambitious, talented and skillful individuals to enter high quality education and training community.

3. **Develop a clearinghouse of industry resources.** One obvious theme of the Skills Council meetings was that there is a plethora of information and resources within the state, but no centralized coordinated way to access it. One idea is a website, perhaps through an e-classroom model, where content can be updated by all Skills Council members. We have gathered some of the resources that were discussed during the Skills Council meetings in *Appendix B*, though this is not a comprehensive list. Industry resources would be of interest to the development of a program of study beginning in high schools, expanding to technical centers and colleges for strengthening public education delivery in green education.

4. **Develop industry internship programs.** Many Skills Council attendees already offer internships, either through their own efforts or with the assistance of an existing structured program. The VBSR internship program, for example, funded in part through

the Department of Labor, could be a model for an internship program specific to the green building industry. Tim Frost of Peregrine Design Build works with a student from St. Michael's College, where interning is a requirement in their academic career. Jennifer Chiodo of CX Associates offered an interesting anecdote: her interns do not necessarily believe they want to enter the industry, indicating yet again the importance of addressing the industry promotion challenges.

Kate Stephenson from Yestermorrow suggested that Yestermorrow's unpaid internship program is successful in part because the interns are allowed to participate in workshops. Perhaps a green building internship could offer a similar perk: free green building trainings in exchange for internship hours.

High school students who are enrolled in a green program of study should have access to employer driven internship opportunities. Students can be part of an industry centered internship that includes not only all aspects of the business, but provides specialized skill training that becomes part of their program of study. Technical Center students who are enrolled in building trades, pre-engineering, and architecture programs are well poised to participate in employer internship programs.

5. **Become direct link to legislators.** The Green Building IECE group might choose to set up events to connect directly with legislators, offering the opportunity for private businesses to voice their concerns in a coordinated effort.

Doug White of JAM Green strongly supports having state inspectors and other regulatory people involved at Skills Council meetings. He expressed the fact that it is important to keep the inspection and regulatory people up to speed on what the industry is doing, especially in terms of new practices and products.

6. **Build relationships between employers and educators.** Such relationship building and knowledge sharing took place naturally amongst the diverse group of attendees at the green building Skills Council meetings. Future meetings could encourage relationship building by rotating facilitators of the meetings, organizing field trips to training facilities or businesses, or facilitating other networking opportunities. As required by state law, every career and technical education program is required to have an active Program Advisory Committee. The Green Building IECE Industry Skills Council could be a key asset to informing the program advisory committees of the latest trends in green building as well as advocate for strengthening related career and technical education programs and instruction.

7. **Expand group to include additional educators and students.** The initial phase of the Skills Council was aimed at creating strong industry partners before taking the next step of making additional connections to educators. We found that Skills Council participants were eager for this next step and wanted to bring additional educators to the table. Several participants also suggested bringing the student voice in on the conversation, especially as relates to ideas for marketing the industry to young people. As well, public and private teachers could benefit from the increased access to industry trends, training,

career awareness, and industry resources that would strengthen programming and instruction.

8. **Enrich the curriculum at Technical Centers.** One solution to the problem of finding time for training is a web-based curriculum or e-classroom concept. The idea of offering web-based trainings to inform the curriculum at Technical Centers on green topics was discussed during the third Skills Council meeting. The representatives from training organizations in the room expressed hesitation, while the employers generally saw potential for the concept. For example, Tim Frost commented: "I'm convinced this kind of thing could work; it could deal with the logjam of when there are problems finding time for training." The Technical Centers already make use of a web-based curriculum program called Ed2Go; another option is the Global Classroom program shown in the image above.

   Additionally, the Vermont Department of Education recently awarded a statewide grant to build a network of online class delivery. The Green Building IECE can work to utilize this system for improving access to Green Building instruction and to allow the courses to be part of a program of study in grades 9-14.

9. **Strengthen program of study skills and knowledge and available certifications.** Green Building skills and knowledge could be added to Career and Technical Center program state competencies as well as be integrated within a 'Green Technologies' program of study. AGC provides technical assistance, facilitates program accreditation and offers students a skills and knowledge evaluation at Career and Technical Centers. According to Beth Hulbert of AGC, only eight of the tech centers take advantage of the evaluation. She believes the IECE could evaluate the competencies, integrate Green Building skills and knowledge into the curriculum and evaluation, and offer value in return (preference in hiring, higher starting wages, advanced standing in apprenticeship) for those who demonstrate proficiency.

5.0 Growing the Vermont Green Building Industry: Next Steps

Findings from the initial Green Building IECE meetings indicate that the Vermont green building industry is well-positioned for growth – and that the industry has the potential to play a key role in Vermont as a major employer and revenue center. However, it is also apparent that there is much work to do to grow Vermont's green building industry so that it is best prepared to meet anticipated demand. It is clear that the industry can benefit from (1) continuing state support focused on workforce development and training resources and programs; (2) an industry steering group in the form of a Green Building Skills Council that convenes regularly to address workforce development and related issues; and (3) a unified industry voice that clearly communicates the importance of the industry for the state as a whole.

It is our recommendation that the industry Skills Council (and additional participants, as appropriate) reconvene throughout 2010 with the objective of visioning the industry, further articulating its needs and directions, and developing an industry roadmap that can help the member businesses and state supporters to navigate the next five years of expected growth. This collaborative process should include the creation of an industry-specific structure, strategy, and process for information-sharing, workforce development, and relationship-building with state decision-makers and other industry stakeholders. For it is only through a considered, collaborative, and strategic approach that one of Vermont's most exciting and promising industries can realize its fullest potential – and contribute its considerable power to the state's advancing economy.

Specific recommendations

1) Create a Green Building 101 curriculum, assessment, and credential for use in CTE programming, program of study (9-14), and other applications that have value among industry and post high school education and training programs. Coordinate online delivery with state distance learning grant.
2) Develop, adopt, and adapt weatherization, renewable energy systems curriculum, assessment and credential for use in CTE programs, college programs, and internships that have value among industry and post high school education and training programs. Coordinate online delivery with state distance learning grant.
3) Develop, adopt, and adapt a model industry centered internship for Green Building – both specialized and more general.
4) Design and launch a Green Building career promotion campaign that will encourage youth to take advantage of existing and modified training and education programs (i.e., CTE, apprenticeship, AGC, Labor, Private Education.) This can include a website that in addition to career information could act as a clearinghouse for Green Building education and training resources.

Appendix A: Contact Information for Skills Council Attendees and Other Interested Parties

Skills Council Contact Information

The following list includes contact information for the Green Building Skills Council participants. Our color-coded sections indicate whether the participant represented an employer in the industry (green), an educator or training facility (yellow), or a government agency (red).

Green Building Skills Council Attendees					
Sub-Category	**Company**	**Name**	**Title**	**Phone**	**Email**
Architects	Dore & Whittier	Bruce Dillon	Director of Business Development	863-1428	bdillon@doreandwhittier.com
Building Commissioning	CX Associates	Jennier Chiodo	Principal	999-1069	jennifer@cx-assoc.com
Building Commissioning	Kilawatt Technologies	Steven "Rocco" Antinozzi	VP of Operations	985-2285 x215	rocco@kilawatt.com
Construction	Bickford Construction	Bob Bickford	Principal	872-7600	bob@bickfordconstruction.com
Construction	JA Morrissey	Jeanne Morrissey	Principal	863-1717	Jeanne@jamteam.com
Construction	JA Morrissey	Doug White	Project Manager	863-1717	doug@jamteam.com
Design/Build	Peregrine Design/Build	Tim Frost	Principal	383-1808 x205.	Tim@peregrinedesignbuild.com
Design/Build	The Design Group VT	Jeff Schoellkopf	Principal	496-2166	jeffs@tdgvt.com
Design/Build	Tom Perry Carpentry, Building & Design	Tom Perry	Board member of VGBN and BSR	434-2462	tsperry@gmavt.net
Redevelopment	Encore Redevelopment	Chad Farrell	Principal	233-3937	chad@encoreredevelopment.com
Labor Union / Training	International Brotherhood of Electrical Workers (IBEW) Local 300	Matt Lash	Membership Development Director	864-5864 x. 15	mlash@ibewlocal300.org
Green Building Association	VT Green Building Network	Nancy Mears	Executive Director	338-7664	NancyMears@vgbn.org

Green Building Skills Council Attendees					
Sub-Category	**Company**	**Name**	**Title**	**Phone**	**Email**
Education: Design / Construction	Yestermorrow	Kate Stephenson	Executive Director	496-5545	kate@yestermorrow.org
Education: Construction / Contractors	Associated General Contractors of Vermont	Beth Hulbert	Director of Workforce Development	223-2374	beth@agcvt.org
Education: Efficiency	VEIC	David Keefe	Expert Staff Trainer	658-6060 x.1064	dkeefe@veic.org
Government	Dept. of Education	Doug Webster	Industry Skill Standards Coordinator	578-7738	doug.webster@state.vt.us
Government	Dept. of Education	Chip Evans	Executive Director of Workforce Development Council	828-4156	Allen.Evans@state.vt.us
Government	Dept. of Labor	Commissioner Patricia Moulton Powden	Vermont Commissioner of Labor	864-5864	pat.moulton.powden@state.vt.us

Other Interested Parties

During our research into the experts in Vermont's green building industry, we met and spoke with many individuals who support the green building IECE, yet were unable to participate in the Skills Council meetings in 2009. The following is a list of individuals with whom we discussed the IECE concepts and who expressed interest in staying in touch on workforce development issues in the future.

Our color-coded sections indicate whether the participant represented an employer in the industry (green), an educator or training facility (yellow), or a government agency (red).

Other Individuals Interested in Green Building IECE					
Sub-Category	**Company**	**Name**	**Title**	**Phone**	**Email**
Civil Engineer	EcoSolutions LLC	David H. Whitney	Principal Engineer	598-6297	dave@ecosoldesigns.com
Construction	DEW Construction Corporation	Donald Wells	President	872-0505	dwells@dewcorp.com
Construction	Pizzagalli Construction Corp.	Andrew Martin	Vice President	658-4100	amartin@pizzagalli.com
Consultants	YellowWood Associates	Shanna Ratner	Principal, Founder	524-6141	shanna@yellowwood.org

Other Individuals Interested in Green Building IECE					
Sub-Category	**Company**	**Name**	**Title**	**Phone**	**Email**
Design/Build	BreadLoaf Corporation	Mike McLaughlin	Vice President of Business Development / Marketing	388-9871	mikemcl@breadloaf.com
Workforce Association	VT Works for Women	Tiffany Bluemle	Executive Director	655-8900	TBluemle@vtworksforwomen.org
Education	Recycle North Youth Build Program	Tom Longstreth	Executive Director	658-4143	TomL@recyclenorth.org
Education	Vermont Technical College Sustainable Design & Technology Program	Joan Richmond	Assistant Professor, Science and Sustainable Design & Technology	728-1717	JRichmond@vtc.vsc.edu
Government	Senator Sanders' Office	Darren Springer	Office of U.S. Senator Bernie Sanders	202-224-5141	darren_springer@sanders.senate.gov

Appendix B: Industry Resources

The following resources were compiled in part through Spring Hill's research on the green building industry and largely through conversations with Skills Council participants. While not a comprehensive list, it is the start of what will hopefully be a useful and 'living' document for the Green Building IECE initiative. Color coded rows indicate whether the resource is on an international/national level (green), state (yellow), or regional/out-of-state (red).

Range	Type of Resource	Name of Resource	Web Source	Notes
Int'l	Accreditation	LEED	www.usgbc.org	VGBN coordinates LEED accreditation & training in VT
Int'l	Certification	Permaculture Design Certification	www.yestermorrow.org/courses/wbc/permcert.htm	Yestermorrow coordinates this in VT
National	Certification	Home Performance with ENERGY STAR Certified Contractor	www.efficiencyvermont.com/pages/Residential/SavingEnergy/HomePerformanceWithENERGYST/informationforContractors/	Efficiency Vermont / VEIC coordinate this program in VT
National	Certification	Building Performance Institute (BPI) Certification	www.bpi.org	Efficiency Vermont / VEIC coordinate trainings in VT
National	Certification	Certified Energy Manager (CEM)	www.aeecenter.org/certification/cempage.htm	
National	Certification	Green Building Engineer (GBE™)	www.aeecenter.org/certification/gbepage.htm	
National	Certification	Certified Green Professional Designation	www.nahbgreen.org/Education/greenprofessional.aspx	National certification from the National Association of Home Builders (NAHB)
National	Directory	Directory of Professional Engineers (PE)	www.energystar.gov/index.cfm?fuseaction=PE_DIRECTORY	Directory of PEs who have performed verifications for buildings that have earned the ENERGY STAR label.
National	Training	Clean Edison	www.cleanedison.com	Green Building Training Offered Nationwide. Limited in VT
National	E-Training	Global Classroom	www.eclassroom.com	
National	E-Training	IBEW Hour Power	http://ibewhourpower.com/	IBEW's web resource for training videos
National	E-Training	My Green Education	www.mygreeneducation.com	
National	News	55 Million in Green Jobs Training Grants Announced by US DOL	www.mygreeneducation.com/55-million-in-green-jobs-training-grants-announced-by-us-department-of-labor/	
National	News	Zpryme research predicts green building markets will grow 146 percent	www.fmlink.com/News/Articles/news.cgi?display=article&id=26850	Also see www.zpryme.com
National	Report	2009 Green Outlook: Trends Driving Change	http://construction.ecnext.com/coms2/summary_0249-294642_ITM_analytics	Report by McGraw-Hill Construction
National	Report	Green Building Could Triple by 2013	www.mcgraw-hill.com/releases/construction/20081118.shtml	Report by McGraw-Hill Construction, Nov 2008
National	Report	Green Building, Green Jobs and the Economy	www.usgbc.org/greeneconomy	Report by USGBC and Booz Allen Hamilton, Nov. 2009

Range	Type of Resource	Name of Resource	Web Source	Notes
National	Report	Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy	www.americanprogress.org/issues/2008/09/pdf/green_recovery.pdf	Report by American Progress, Sept. 2008
National	Report	Job Opportunities for the Green Economy: A State-by-State Picture of Occupations	www.peri.umass.edu/fileadmin/pdf/other_publication_types/Green_Jobs_PERI.pdf	Report by Political Economy Research Institute, June 2008
National	Report	First Metro Green Jobs Report Projects 4.2 Million Jobs by 2038	www.vermontquality.org/greenjobsrelease_mayors.pdf	Report by US Conference of Mayors
National	Workforce Resource	O*NET OnLine	http://online.onetcenter.org/find/green?n=7&g=Go	Information about Occupations and Skills
Out of State	Web Resource	CT Energy Info: Your Energy Info Center	www.ctenergyinfo.com/	Focus on energy resources in Connecticut
Out of State	Workforce Resource	LA Infrastructure and Sustainable Jobs Collaborative	www.lattc.edu/dept/lattc/REDI/Utility.html	Focus on Los Angeles
Out of State	Workforce Resource	Special Series: Green Collar Jobs: Realizing the Promise	http://daily.sightline.org/daily_score/series/green-collar-jobs-realizing-the-promise	Focus on Northwest region
Regional	Workforce Resource	Green Careers NY	www.greencareersny.com/	NY State's new green jobs web resource
Regional	Workforce Resource	Hudson Valley Regional Council	www.hvregionalcouncil.org/	Annual conference on green education and workforce development
State	Certification	Vermont Builds Greener	www.bsr-vt.org/vbg/vbgindex.html	Builders for Social Responsibility coordinates this
State	Certification	IBEW Solar Installation Training	www.ibewlocal300.org	
State	Education	The Flashbulb Institute	www.theflashbulb.org/	Burlington-based educational resource
State	Education	Yestermorrow Design/Build School	www.yestermorrow.org	
State	Green Alliance	Vermont Green Home Alliance	www.vermontgreenhomealliance.org/	
State	Green Building Association	Home Builders and Remodelers Association of Northern Vermont	www.vtbuilders.com/	Training resource
State	Green Building Association	Vermont Green Building Network	www.vgbn.org	Training resource
State	Report	Advancing Vermont's Creative Economy	www.sover.net/~vcrd/pdf/vcci-report.pdf	Report by VT Council on Culture and Innovation
State	Report	Promoting and Fostering the Green Economy in Vermont	http://economicdevelopment.vermont.gov/Portals/0/Green_Strategy.pdf	Report by Vermont Agency of Commerce and Community Development
State	Report	The Green Economy and Environmental Enterprises in Vermont: Opportunities for the 21st Century	http://economicdevelopment.vermont.gov/Portals/0/Green_Strategy.pdf	Report by GBIC
State	State Chapter - Contractor Association	Associated General Contractors	www.agcvt.org/	Training resource
State	State Chap-Electricians	International Brotherhood of Electrical Workers- Local 300	www.ibewlocal300.org/	Training resource
State	Workforce Resource	Chittenden Workforce Alliance	chittendenworkforcealliance@gmail.com	